Installation Manual for P170002/R170003 Compressor Lincoln Air Vantage 500 Welder (Cummins)

1.0	Information	4
2.0	Preparation	14
3.0	Compressor Removal	14
4.0	Flushing Procedure	15
5.0	Compressor Installation	16
6.0	Completing the Installation	22
7.0	Preparing to Operate	22
8.0	Starting the System	24
9.0	Component Failure Procedure	24
10.0	Servicing Intervals and Information	25

VMAC – ***Vehicle Mounted Air Compressors***
Toll Free: 1-888-241-2289
Fax: 1-250-740-3201

Changes and Revisions

Version	Revision Details	Revised by/date	Approved by/date	Implemented
A	Original manual issue	SL 08 Dec 2009	MH 10 Dec 2009	SL 11 Dec 2009
B	ECN #09-123	SL 28 Jan 2010	MH 02 Feb 2010	SL 02 Feb 2010
C	ECN#11-144	MH 06 Dec 2011	MH 06 Dec 2011	20 Dec 2011
D	ECN 14-026	MH 23APR2014	MP 12 Jun 2014	12 Jun 2014

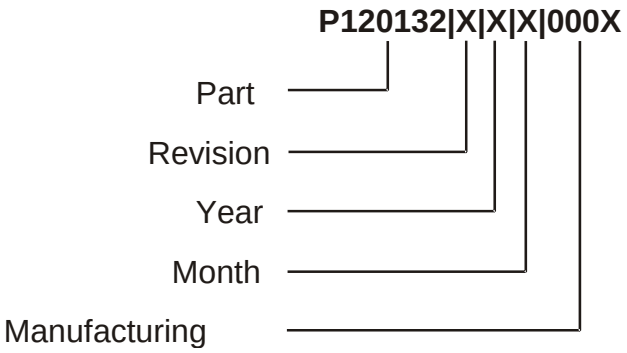
Trademarks:

VMAC is a registered trademark of VMAC, Division of Mangonel Corporation
Lincoln is trademarks of The Lincoln Electric Company
Loctite is registered trademarks of Loctite Corporation
Notice: Manuals and products are subject to change without notice

Copyright 2010
The contents of this manual may not be reproduced in any form without written permission of VMAC
PRINTED IN CANADA

VMAC – ***Vehicle Mounted Air Compressors***
Toll Free: 1-888-241-2289
Fax: 1-250-740-3201

Serial Number Breakdown Description



A-H, J-N, P, R, T-W, Y ONLY AS PER ASME STANDARD: Y14.35

YEAR	MONTH
X - 2009	A - JANUARY
Y - 2010	B - FEBRUARY
Z - 2011	C - MARCH
AA - 2012	D - APRIL
AB - 2013	E - MAY
	F - JUNE
	G - JULY
	H - AUGUST
	I - SEPTEMBER
	J - OCTOBER
	K - NOVEMBER
	L - DECEMBER

1.0 Information

1.1 Forward

This manual provides replacement instructions for the G4481 air compressor. Proper and regular servicing provide continuing high performance and long life at low cost. For more information contact VMAC.

KEEP THIS MANUAL WITH THE WELDING/AIR COMPRESSOR UNIT FOR USER REFERENCE

1.2 Important Safety Notice

WHEN THE ENGINE IS RUNNING, EVEN WITH THE COMPRESSOR OFF, THE COMPRESSOR WILL PRODUCE UP TO 50 PSI (414 kPa) OF COMPRESSED AIR. NEVER WORK ON THE COMPRESSOR SYSTEM WITH THE ENGINE RUNNING. ALWAYS ALLOW PRESSURE TO DRAIN FOR A MINIMUM OF 5 MINUTES, OPEN THE SUPPLY VALVE AND TRIGGER ANY TOOLS ATTACHED TO DEPRESSURIZE THE SYSTEM BEFORE SERVICING THE COMPRESSOR AND COMPONENTS.

The information contained in this manual is based on sound engineering principles, research, extensive field experience and technical information. Information is constantly changing with the addition of new models, assemblies and service techniques. If a discrepancy is noted in this service manual, contact VMAC prior to initiating or proceeding with service. Current information may clarify the matter. Any person with knowledge of such discrepancies who performs service and repair assumes all risks.

Only proven service procedures are recommended. Anyone who departs from the specific instructions provided in this manual must first assure that their safety and that of others is not being compromised and that there will be no adverse effects on performance or the operational safety of the equipment.

Neither VMAC nor Lincoln will be held responsible for any liability, injuries, loss or damage to individuals or to equipment as a result of the failure of any person to properly adhere to the procedures set out in this manual or standard safety practices. Safety should be your first consideration in performing service operations. If you have any questions concerning the procedures in this manual or require any more information on details that are not included in this manual, please contact VMAC before beginning repairs.

1.3 Safety Messages

This symbol is used to call your attention to instructions concerning your personal safety. Watch for this symbol; it points out important safety precautions, it means "attention, become alert!" Your personal safety is involved. Read the message that follows and be alert to the possibility of personal injury or death. Be alert; your safety is involved. While it is impossible to warn about every conceivable hazard, let good common sense be your guide.

This symbol is used to call your attention to instructions on a specific procedure that if not followed may damage or reduce the useful life of the compressor.

This symbol is used to call your attention to additional instructions or special emphasis on a specific procedure.

Safety Precautions

Read this information before operating the compressor for the first time. Follow the information and procedures in this manual for operation, maintenance and repair. Observe the following items to reduce the chance of personal injury or equipment damage.
Follow all safety precautions for mechanical work. Moving drive belts or fan blades are an extreme hazard. Stay clear of all moving parts when the system is operating. Only qualified personnel should perform maintenance and repair on system components with the welder/compressor shutdown.

Proper service and repair are important to the safety of the service technician and the safe, reliable operation of the equipment. Always use genuine VMAC replacement parts; do not use a substitute.

The procedures described in this service manual are effective methods of service and repair. Some procedures may require the use of tools specially designed for a specific purpose. Anyone using a replacement part, service procedure or tool must first determine that neither their safety nor the safe operation of the equipment will be compromised by the replacement part, service procedure or tool selected.

This manual contains various warnings, cautions and notices that must be observed to reduce the risk of personal injury during service or repair and the possibility that improper service or repair may damage the equipment or render it unsafe. Be aware that it is impossible to warn of all the possible hazardous consequences that might result from failure to follow these instructions.

Fire and Explosion Hazards

Fire in the compressor can cause an explosion and flame projection. Should this occur, there is potential for serious injury or death.

Vaporized oil propelled by high-pressure air is an explosive mixture.

You must observe the following when operating the compressor:

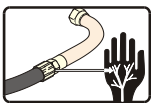
- constant vigilance is necessary around high-energy equipment
- be attentive for unexplained changes in operation parameters and record any changes
- never bypass or disable the oil temperature switch
- never expose the tank or compressor to extreme heat
- ensure that the air entering the compressor is free of flammable vapors

Personal Hazards

Follow all safe work practices. Wear the appropriate safety equipment.

Do not breathe the compressor air. Vaporized oil is a respiratory hazard.

Always use the appropriate personal protective equipment, particularly eye and hearing protection when operating air-powered equipment.



The compressor system is under sufficient pressure that a leak could force the oil/air mixture through the skin directly into your blood stream. This will cause death.

Never adjust or attempt to make any repairs to the compressor system while engine is running. Components and hoses under pressure could separate suddenly and fly out and cause serious injury or death.

Never perform maintenance procedures on the system until the Welder/Compressor has been shut down for 5 minutes. After 5 minutes open the pressure supply valve to ensure the system is depressurized. Failure to depressurize the system could cause parts to separate explosively. Flying parts could cause serious injury or death. Oil/air mixture could be

sprayed out with sufficient force to penetrate the skin, which could cause serious injury or death.

The compressor and the compressor system gets very hot during operation, contact with the components or the oil can cause serious burns.

Components and hoses under pressure could separate suddenly and fly out and cause serious injury or death. The auxiliary air tank must be drained before servicing any components in the compressor system.1.4 System

The compressor system is protected from over pressurization by a mechanical inlet control in the compressor that regulates air flow in response to the demand. There is also a 200 PSI (1,379 kPa) pressure relief valve in the oil/air separation tank to protect the system from over pressurization. If the oil temperature exceeds 290°F (143°C) the system is switched off, draining the high pressure air and reducing the load on the engine.

VMAC certified and approved high performance synthetic oil is used to lubricate the compressor and is the only approved lubricant. Any other oil will void the warranty. The oil/air separator tank removes most of the oil from the compressed air and the coalescing separating filter removes the remaining oil. The oil is passed through a replaceable filter to remove contaminants.

The compressor intake is equipped with a replaceable paper filter element.

Illustrated Parts Lists

New Model Cummins System

Old Model Cummins System

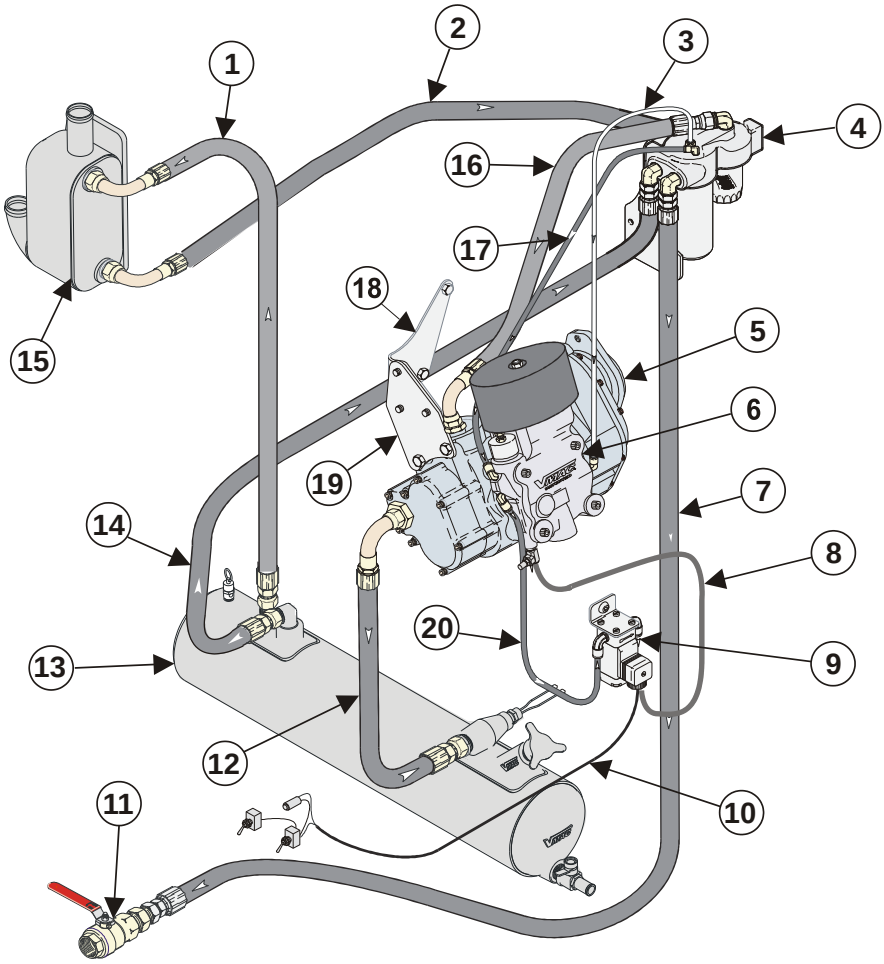


Figure 1 – New Model Cummins System Diagram

Parts List for New Model Cummins System

Item	QTY	Part Number	Description
1	1	1710619	Hose Assembly, Oil/Air Separator Tank to Cooler
2	1	1710620	Hose Assembly, Oil Cooler to Manifold
3	1	1710759	Tube, 1/4" Outside Diameter, Scavenge Line (White), Manifold to Compressor
4	1	4800382	Assembly, Bracket, Manifold
5	1	P170002	Assembly, Compressor
6	1	9300016	Inlet Valve, G4481
7	1	1710618	Hose Assembly, Discharge, Manifold to Supply Valve
8	1	1710714	Tube, 1/4" Outside Diameter, Compressor 'On/Off' (Red), Solenoid Valve to Inlet Valve
9	1	4800366	Assembly, Solenoid Valve
10	1	3550685	Electrical Harness
11	1	4800371	Assembly, Discharge Valve
12	1	1710624	Hose Assembly, Supply, Compressor to Oil/Air Separator Tank
13	1	9300055	Assembly, Tank, Aluminum
14	1	1710627	Hose Assembly, Oil/Air Separator Tank to Manifold
15	1	9300056	Assembly, Cooler
16	1	1710619	Hose Assembly, Oil/Return, Manifold to compressor
17	1	1710622	Tube, 1/4" Outside diameter, System Pressure (Black), Manifold to Inlet Control Valve
18	1	1200366	Bracket, Compressor
19	1	1200365	Bracket, Compressor
20	1	1710623	Tube, 1/4" Outside Diameter, System Pressure (Black), Manifold to Inlet Control Valve

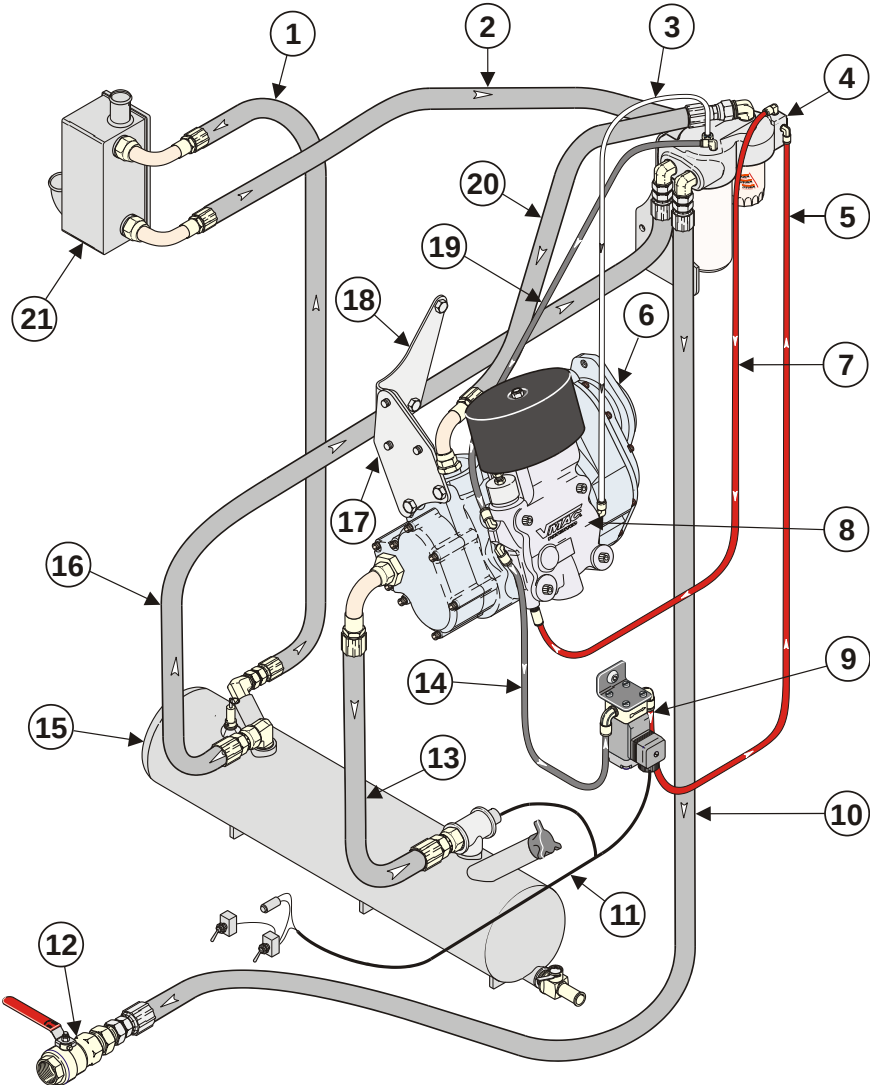


Figure 2 – Old Model Cummins System Diagram

VMAC – ***Vehicle Mounted Air Compressors***
Toll Free: 1-888-241-2289
Fax: 1-250-740-3201

Parts List for Old Model Cummins System

Item	QTY	Part Number	Description
1	1	1710619	Hose Assembly, Oil/Air Separator Tank to Cooler
2	1	1710620	Hose Assembly, Oil Cooler to Manifold
3	1	1710621	Tube, 1/4" Outside Diameter, Scavenge Line (White), Manifold to Compressor
4	1	4800382	Assembly, Bracket, Manifold
5	1	1710625	Tube, 1/4 Outside Diameter, Compressor 'On/Off', (red) Solenoid to Manifold
6	1	P170002	Assembly, Compressor
7	1	1710626	Hose Assembly, 33"
8	1	9300016	Assembly, Inlet Control Valve
9	1	4800366	Assembly, Solenoid Valve
10	1	1710618	Hose Assembly, Discharge, Manifold to Supply Valve
11	1	3550685	Electrical Harness
12		4800371	Assembly, Discharge Valve
13	1	1710624	Hose Assembly, Supply, Compressor to Oil/Air Separator Tank
14	1	1710623	Tube, 1/4 Outside Diameter, (Black) Compressor to Solenoid Valve
15	1	9300031	Assembly, Tank, Aluminum
16	1	1710627	Hose Assembly, Oil/Air, Separator Tank to Manifold
17	1	1200365	Bracket, Compressor
18	1	1200366	Bracket, Compressor
19	1	1710623	Tube, 1/4 Outside Diameter, (Black) Manifold to Inlet Control Valve
20	1	1710619	Hose Assembly, Oil Return, Manifold to Compressor
21	1	9300056	Assembly, Cooler

2.0 Preparation

2.1 Disconnect battery.

2.2 Drain compressor system oil.

2.3 Remove the unit side panels for good access. Label all hoses and air lines and wiring before disconnection.

3.0 Compressor Removal

To release the poly tube from the fittings, push on the outer ring and pull the tube out.

3.1 Disconnect the black, red and white poly lines from the inlet control valve. Remove the inlet control valve from the compressor (4 M8 socket head bolts).

Cover the inlet to the compressor rotors to prevent debris entering.

3.2 Remove the 3/4” air discharge hose from the compressor.

3.3 Disconnect the 1/2” oil return hose from the compressor to the oil filter manifold, at the compressor end.

3.4 Remove the three fasteners from the rear compressor brackets then remove the engine bracket and oil dip stick.

3.5 Loosen the two front compressor securing nuts on the engine studs and slide the compressor back to allow nuts to be removed.

3.6 Remove the compressor by sliding it off the splines.

3.7 Clean any debris from the PTO port on the engine and inspect the female spline on the engine for damage and replace it if necessary.

4.0 Flushing Procedure

Component failure (such as a gearbox, compressor, hose or cooler core) can leave metal filings and other foreign materials in the system. To flush the system, follow this procedure:

4.1 Before replacing any failed component, check all other system components for evidence of contamination and clean as thoroughly as possible. Use compressed air to blow out the lines and other components.

4.2 Once the system has been cleaned as thoroughly as possible, replace the failed component and reconnect all lines and fittings.

4.3 Install a new oil filter and fill the system with VMAC compressor oil to the correct level.

4.4 Start the engine and engage the air system. Allow the system to pressurize and allow it to operate in no-load mode for about 15 minutes without discharging any air.

4.5 Shut-down, allow the system to cool and change the oil, oil filter, and coalescing element. Refill with compressor oil to the correct level.

4.6 After 50 hours, replace the oil filter and top up the oil level.

The replacement compressor issued has the same performance as the compressor removed. However, the replacement compressor features a lightweight aluminum housing for easy installation.

5.0 Compressor Installation

5.1 Remove the two compressor-mounting studs from engine and install two new studs provided and apply Loctite 242 blue to external thread. Ensure slotted end is not installed into the engine (Figure 5.1).

Figure 5.1 – Installing mounting studs

5.2 Install new o-ring on compressor spline port housing (Figure 5.2).

Figure 5.2 – Spline port housing O-ring

5.3 Before installing the compressor apply a sufficient amount of spline grease to the spline shaft.

5.4 Remove the compressor-mounting bracket from the rear of the replacement compressor before installation (Figure 5.3).

Figure 5.3 – Compressor mount bracket

5.5 To install the compressor, move the compressor into position and align the compressor mounting holes at the front of the compressor with mounting studs. Engage the spline and ease the compressor spline into the PTO spline on the engine (Figure 5.4).

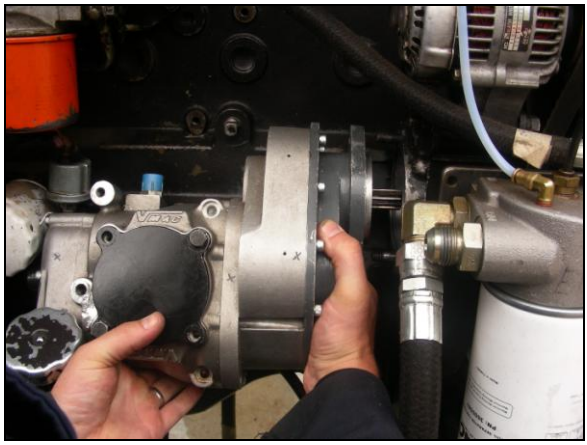


Figure 5.4 – Installing the compressor

5.6 Secure compressor to the engine using the two M10 nuts provided. The lower M10 nut needs to be installed first by sliding the compressor back so the mounting stud is flush with the compressor mounting flange. Now place the M10 nut into position and slide the compressor forward, so the stud is now in contact with the M10 nut (Figure 5.5). Thread the nut onto the stud and slide the compressor forward and tighten M10 nut onto lower stud. Now thread upper M10 nut to the upper stud and tighten.

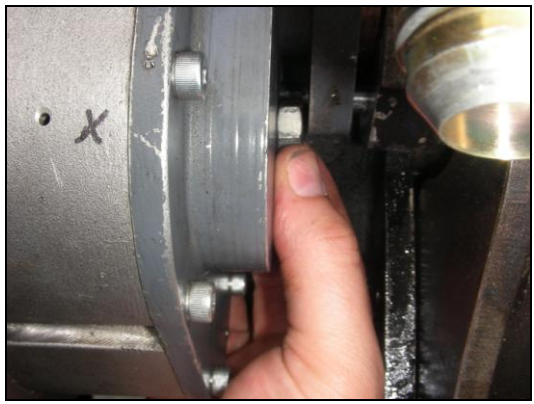


Figure 5.5 – Securing lower mount stud

5.7 Take the engine mount bracket provided and mount it to the engine using the engine mount fasteners from the previous bracket used, but do not tighten. Refer to figure 5.6.

Figure 5.6 – Engine mount bracket

5.8 Mount the rear compressor bracket onto the compressor, (Figure 5.7) loosely and align so compressor bracket is flush with the engine bracket previously installed.

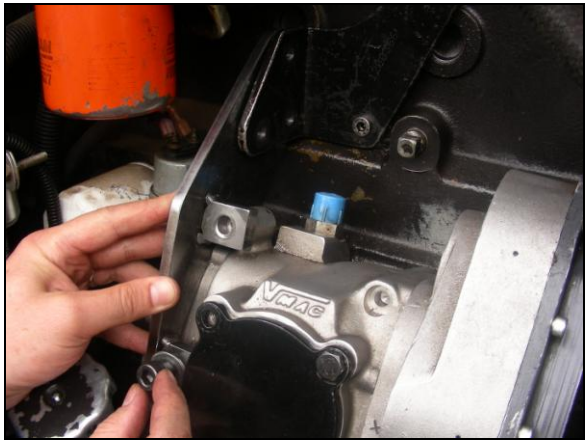


Figure 5.7 – Installing compressor bracket

5.9 Apply Loctite 242 on threads. Align and install two compressor bracket fasteners as shown in Figure 5.7.Do not tighten.

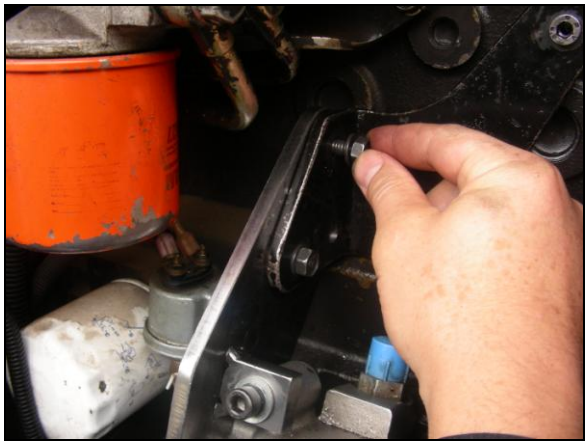


Figure 5.8 – Bracket fasteners

5.10 Align the 3 bracket holes and thread in 2 fasteners loosely as shown in figure 5.8. Install engine oil dipstick previously removed and align with hole which does not have fastener installed. Install remaining fastener with flat washer and lock washer and tighten only until dipstick remains in place.

Figure 5.9 – Securing the engine oil dipstick

5.11 Tighten engine bracket fasteners, rear compressor bracket fasteners, and 3 bracket fasteners in that order. (Figure 5.10).

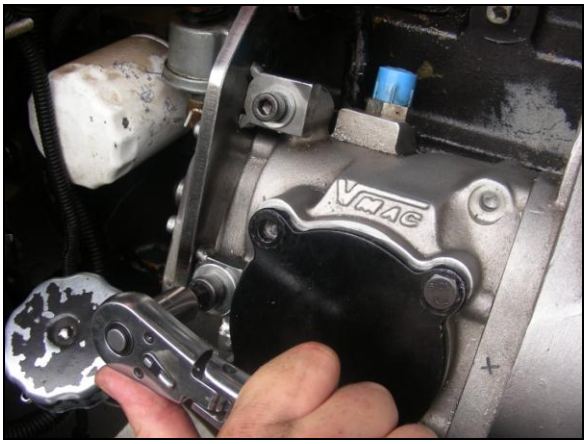


Figure 5.10 – Securing the compressor bracket

5.12 Connect ½" oil return hose from compressor to oil filter manifold at the compressor end.

5.13 Connect the ¾" discharge hose to the steel fitting at the rear of the compressor.

5.14 Remove the protective cover on the inlet valve port. Reattach inlet valve to compressor in same orientation as was removed using (4 M8 Socket head cap screws).

Note: Ensure two longer inlet bolts are at the top and the two shorter bolts are at the bottom.

5.15 Reconnect the black, red and white poly lines to the inlet control valve.

Note: Ensure that the black, red, and white poly lines are free from any contact with sharp corners that may cause excessive abrasion.

6.0 Completing the Installation

6.1 Reconnect all wiring and hoses.

If old hoses or any old components are used they <u>MUST</u> be flushed. Please follow the flushing procedure as outlined in section 4.0.

6.2 Tighten all fasteners to recommended toque figures.

6.3 Fill the system with correct level of oil.

When adding oil to the system it should be taken into account that there will be residual oil remaining in various components. If the system is overfilled oil carry-over may result.

Approximate Component amounts.

System Component	
Compressor	200ml,
Compressor to tank discharge hose	400ml
Oil Filter Coalescing filter unit	400ml
Tank	3.5 L
Cooler	500ml
Total	5L

This oil should be drained out as much as possible, If necessary, remove components to complete draining process.

7.0 Preparing to Operate

Before you start the system, you must install a connector into the outlet of the system. Depending on your application, this could include a right-angle adapter and quick-connect or could be a flexible line that runs to a remote location.

We recommend that you purchase the factory test device (part number A700052) with an orifice size of 3/16 inch,or you can construct a device as shown in Figure 4.1 and install this onto the discharge outlet so that you can control and monitor system operation.

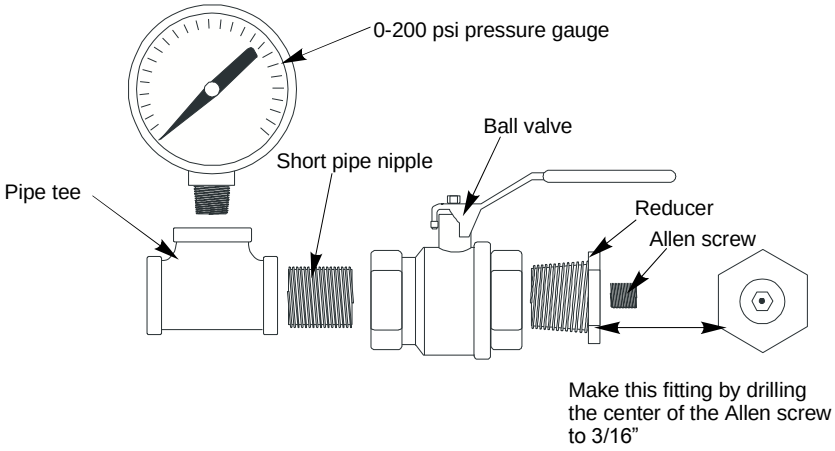


Figure 7.1 - Typical test device

If you use a solid plug rather than a reducer, you must drill out the inside of the plug (Figure 7.2), as a straight, small hole through the solid plug will not provide proper operational simulation.

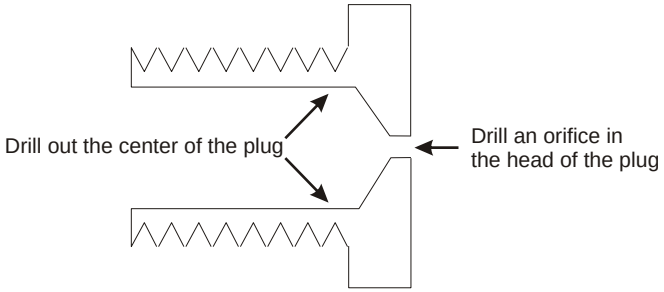


Figure 7.2 - Drilling the orifice

Once you have installed the test device and have verified that the installation is complete, you are ready to start the system.

8.0 Starting the System

Follow the start up procedure as per operator's manual Lincoln Airvantage 500.

1. While the system operates at high idle, do an inspection tour. Check the following:
   - lines and hose to make sure that the fittings are not leaking
   - oil cooler and engine cooling system to make sure that there are not leaks
   - lines and fittings at the tank for leaks
   - air filter filter for leaks
   - any unusual vibration or grinding noises
2. Once you are satisfied that everything is operating normally and that the engine cooling system level is correct, open the valve on the test attachment.
3. The gauge should read approximately 100psi with some variation due to gauge error.

9.0 Component Failure Procedure

The following procedure should be followed in the event of component failure, such as compressor, gearbox, tank, hose or cooler core. In short, any sort of component failure which could introduce foreign material into the oil system.

9.1 Prior to the replacement of any failed components, check all other system components for evidence of contamination and thoroughly clean as far as is practical. This may involve blowing out lines / compressor with compressed air etc.

9.2 When all reasonable precautions have been made to remove any foreign materials from the oil system, install the replacement component and reconnect all lines.

9.3 Add 4L of VMAC compressor oil to the system. The VMAC oil has been proven to be the best course of action to remove any debris from the system.

9.4 Run the system for about 15min in a “no load” state i.e. without discharging any compressed air from service air lines.

9.5 Do a 500hr servicing.

10.0 Servicing Intervals and Information

Regular service intervals are 500 hours. Use service kit P/N A700100 this includes:

VMAC Part Number	Description
3600037	Air Filter
9200039	Oil Filter
A700091	VR High Performance Oil – 1 L
A700094	VR High Performance Oil – 4 L

Heavy Duty or extreme dust environment

VMAC Part Number	Description
A700136	Remote Heavy Duty Air Filter (complete unit)
A700138	Remote Heavy Duty Air Filter w/Cyclone-70CFM

Heavy Duty or extreme dust environment service intervals

Change

Stock (small) Air Filters = 50 hours of compressor use.

Heavy Duty Air Filters = 250 hours of compressor use.

Oil = 250 hours of compressor use.

Oil Filters = 250 hours of compressor use.

Coalescent Filter = 250 hours of compressor use.

Check / Inspect

Inspect air filter for contamination every 5 days whether compressor has been used or not.

Before each use

• check the level of oil in the oil/air separator tank.

• check pressure supply valve is in good working order.

• check compressor and hoses for damage or wear.

• check after cooler drain collection bottle (if equipped).

Each 250 Hrs

Check Flange stud Torque (compressor to PTO studs).